

# DHCP Client and Server

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Lobometrics RouterOS V2.8

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## General Information

### Summary

The DHCP (Dynamic Host Configuration Protocol) is needed for easy distribution of IP addresses in a network. The Lobometrics RouterOS implementation includes both - server and client parts and is compliant with RFC2131.

General usage of DHCP:

- IP assignment in LAN, cable-modem, and wireless systems
- Obtaining IP settings on cable-modem systems

IP addresses can be bound to MAC addresses using static lease feature.

DHCP server can be used with Lobometrics RouterOS HotSpot feature to authenticate and account DHCP clients. See the [HotSpot Manual](#) for more information.

### Quick Setup Guide

This example will show you how to setup DHCP-Server and DHCP-Client on Lobometrics RouterOS.

- Setup of a DHCP-Server.

1. Create an IP address pool

```
/ip pool add name=dhcp-pool ranges=172.16.0.10-172.16.0.20
```

2. Add a DHCP network which will concern to the network **172.16.0.0/12** and will distribute a gateway with IP address **172.16.0.1** to DHCP clients:

```
/ip dhcp-server network add address=172.16.0.0/12 gateway=172.16.0.1
```

3. Finally, add a DHCP server:

```
/ip dhcp-server add interface=wlan1 address-pool=dhcp-pool
```

- Setup of the DHCP-Client (which will get a lease from the DHCP server, configured above).

1. Add the DHCP client:

```
/ip dhcp-client add interface=wlan1 use-peer-dns=yes \  
add-default-route=yes disabled=no
```

2. Check whether you have obtained a lease:

```
[admin@Server] ip dhcp-client> print detail
```

---

```
Flags: X - disabled, I - invalid
0   interface=wlan1 add-default-route=yes use-peer-dns=yes status=bound
    address=172.16.0.20/12 gateway=172.16.0.1 dhcp-server=192.168.0.1
    primary-dns=159.148.147.194 expires-after=2d23:58:52
[admin@Server] ip dhcp-client>
```

## Specifications

Packages required: *dhcp*

Home menu level: */ip dhcp-client, /ip dhcp-server, /ip dhcp-relay*

Standards and Technologies: [DHCP](#)

## Description

The DHCP protocol gives and allocates IP addresses to IP clients. DHCP is basically insecure and should only be used in trusted networks. DHCP server always listens on UDP 67 port, DHCP client - on UDP 68 port. The initial negotiation involves communication between broadcast addresses (on some phases sender will use source address of **0.0.0.0** and/or destination address of **255.255.255.255**). You should be aware of this when building firewall.

## Additional Documents

- [ISC Dynamic Host Configuration Protocol \(DHCP\)](#)
- [DHCP mini-HOWTO](#)
- [ISC DHCP FAQ](#)

## DHCP Client Setup

Home menu level: */ip dhcp-client*

## Description

The Lobometrics RouterOS DHCP client may be enabled on any Ethernet-like interface at a time. The client will accept an address, netmask, default gateway, and two dns server addresses. The received IP address will be added to the interface with the respective netmask. The default gateway will be added to the routing table as a dynamic entry. Should the DHCP client be disabled or not renew an address, the dynamic default route will be removed. If there is already a default route installed prior the DHCP client obtains one, the route obtained by the DHCP client would be shown as invalid.

## Property Description

**address** (*IP address | netmask*) - IP address and netmask, which is assigned to DHCP Client from the Server

**add-default-route** (yes | no; default: **yes**) - whether to add the default route to the gateway specified by the DHCP server

**client-id** (*text*) - corresponds to the settings suggested by the network administrator or ISP. Commonly it is set to the client's MAC address, but it may as well be any test string

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**dhcp-server** (*IP address*) - IP address of the DHCP Server

**enabled** (yes | no; default: **no**) - whether the DHCP client is enabled

**expires-after** (*time*) - time, which is assigned by the DHCP Server, after which the lease expires

**gateway** (*IP address*) - IP address of the gateway which is assigned by DHCP Server

**host-name** (*text*) - the host name of the client as sent to a DHCP server

**interface** (*name*) - any Ethernet-like interface (this includes wireless and EoIP tunnels) on which the DHCP Client searches the DHCP Server

**primary-dns** (*IP address*) - IP address of the primary DNS server, assigned by the DHCP Server

**secondary-dns** (*IP address*) - IP address of the secondary DNS server, assigned by DHCP Server

**primary-ntp** - IP address of the primary NTP server, assigned by the DHCP Server

**secondary-ntp** - IP address of the secondary NTP server, assigned by the DHCP Server

**status** (*bound | error | rebinding... | renewing... | requesting... | searching... | stopped*) - shows the status of DHCP Client

**use-peer-dns** (yes | no; default: **yes**) - whether to accept the DNS settings advertized by DHCP server (they will be overriden in /ip dns submenu)

**use-peer-ntp** (yes | no; default: **yes**) - whether to accept the NTP settings advertized by DHCP server (they will override the settings put in the /system ntp client submenu)

## Command Description

**release** - release current binding and restart DHCP client

**renew** - renew current leases. If the renew operation was not successful, client tries to reinitialize lease (i.e. it starts lease request procedure (rebind) as if it had not received an IP address yet)

## Notes

If **host-name** property is not specified, client's system identity will be sent in the respective field of DHCP request.

If **client-id** property is not specified, client's MAC address will be sent in the respective field of DHCP request.

If **use-peer-dns** property is enabled, the DHCP client will unconditionally rewrite the settings in **/ip dns** submenu. In case two or more DNS servers were received, first two of them are set as primary and secondary servers respectively. In case one DNS server was received, it is put as primary server, and the secondary server is left intact.

## Example

To add a DHCP client on **ether1** interface:

```
/ip dhcp-client add interface=ether1 disabled=no
[admin@lobo916] ip dhcp-client> print detail
Flags: X - disabled, I - invalid
0   interface=ether1 add-default-route=no use-peer-dns=no status=bound
    address=192.168.25.100/24 dhcp-server=10.10.10.1 expires-after=2d21:25:12
[admin@lobo916] ip dhcp-client>
```

---

## DHCP Server Setup

Home menu level: */ip dhcp-server*

### Description

The router supports an individual server for each Ethernet-like interface. The Lobometrics RouterOS DHCP server supports the basic functions of giving each requesting client an IP address/netmask lease, default gateway, domain name, DNS-server(s) and WINS-server(s) (for Windows clients) information (set up in the DHCP networks submenu)

In order DHCP server to work, you must set up also IP pools (do not include the DHCP server's IP address into the pool range) and DHCP networks.

It is also possible to hand out leases for DHCP clients using the RADIUS server, here are listed the parameters for used in RADIUS server.

Access-Request:

- **NAS-Identifier** - router identity
- **NAS-IP-Address** - IP address of the router itself
- **NAS-Port** - unique session ID
- **NAS-Port-Type** - Ethernet
- **Calling-Station-Id** - client identifier (active-client-id)
- **Framed-IP-Address** - IP address of the client (active-address)
- **Called-Station-Id** - name of DHCP server
- **User-Name** - MAC address of the client (active-mac-address)
- **Password** - ""

Access-Accept:

- **Framed-IP-Address** - IP address that will be assigned to client
  - **Framed-Pool** - ip pool from which to assign ip address to client
  - **Rate-Limit** - Datarate limitation for clients DHCP clients. Format is: rx-rate[/tx-rate] [rx-burst-rate[/tx-burst-rate] [rx-burst-threshold[/tx-burst-threshold] [rx-burst-time[/tx-burst-time]]]]. All rates should be numbers with optional 'k' (1,000s) or 'M' (1,000,000s). If tx-rate is not specified, rx-rate is as tx-rate too. Same goes for tx-burst-rate and tx-burst-threshold and tx-burst-time. If both rx-burst-threshold and tx-burst-threshold are not specified (but burst-rate is specified), rx-rate and tx-rate is used as burst thresholds. If both rx-burst-time and tx-burst-time are not specified, 1s is used as default.
  - **Ascend-Data-Rate** - tx/rx data rate limitation if multiple attributes are provided, first limits tx data rate, second - rx data rate. If used together with Ascend-Xmit-Rate, specifies rx rate. 0 if unlimited
  - **Ascend-Xmit-Rate** - tx data rate limitation. It may be used to specify tx limit only instead of sending two sequential Ascend-Data-Rate attributes (in that case Ascend-Data-Rate will specify the receive rate). 0 if unlimited
  - **Session-Timeout** - max lease time (lease-time)
-

## Property Description

**add-arp** (yes | no; default: **no**) - whether to add dynamic ARP entry:

- **no** - either ARP mode should be enabled on that interface or static ARP entries should be administratively defined in /ip arp submenu

**address-pool** (*name* | *static-only*; default: **static-only**) - IP pool, from which to take IP addresses for clients

- **static-only** - allow only the clients that have a static lease (i.e. no dynamic addresses will be given to clients, only the ones added in lease submenu)

**always-broadcast** (yes | no; default: **no**) - always send replies as broadcasts

**authoritative** (yes | no; default: **no**) - whether the DHCP server is the only one DHCP server for that network

**bootp-support** (*none* | *static* | *dynamic*; default: **static**) - support for BOOTP clients

- **none** - do not respond to BOOTP requests
- **static** - offer only static leases to BOOTP clients
- **dynamic** - offer static and dynamic leases for BOOTP clients

**delay-threshold** (*time*; default: **none**) - if secs field in DHCP packet is smaller than delay-threshold, then this packet is ignored

- **none** - there is no threshold (all DHCP packets are processed)

**interface** (*name*) - Ethernet-like interface name

**lease-time** (*time*; default: **72h**) - the time that a client may use an address. The client will try to renew this address after a half of this time and will request a new address after time limit expires

**name** (*name*) - reference name

**nntp-server** (*text*) - the DHCP client will use these as the default NTP servers. Two comma-separated NTP servers can be specified to be used by DHCP client as primary and secondary NTP servers

**relay** (*IP address*; default: **0.0.0.0**) - the IP address of the relay this DHCP server should process requests from:

- **0.0.0.0** - the DHCP server will be used only for direct requests from clients (no DHCP really allowed)
- **255.255.255.255** - the DHCP server should be used for any incoming request from a DHCP relay except for those, which are processed by another DHCP server that exists in the /ip dhcp-server submenu

**src-address** (*IP address*; default: **0.0.0.0**) - the address which the DHCP client must send requests to in order to renew an IP address lease. If there is only one static address on the DHCP server interface and the source-address is left as 0.0.0.0, then the static address will be used. If there are multiple addresses on the interface, an address in the same subnet as the range of given addresses should be used

**use-radius** (yes | no; default: **no**) - whether to use RADIUS server for dynamic leases

## Notes

If using both - Universal Client and DHCP Server on the same interface, client will only receive a

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DHCP lease in case it is directly reachable by its MAC address through that interface (some wireless bridges may change client's MAC address).

If **authoritative** property is set to **yes**, the DHCP server is sending rejects for the leases it cannot bind or renew. It also may (although not always) help to prevent the users of the network to run illicitly their own DHCP servers disturbing the proper way this network should be functioning.

If **relay** property of a DHCP server is not set to **0.0.0.0** the DHCP server will not respond to the direct requests from clients.

## Example

To add a DHCP server to interface **ether1**, lending IP addresses from **dhcp-clients** IP pool for 2 hours:

```
/ip dhcp-server add name=dhcp-office disabled=no address-pool=dhcp-clients \  
interface=ether1 lease-time=2h  
[admin@lobo916] ip dhcp-server> print  
Flags: X - disabled, I - invalid  
#   NAME                INTERFACE RELAY                ADDRESS-POOL LEASE-TIME ADD-ARP  
0   dhcp-office         ether1                dhcp-clients 02:00:00  
[admin@lobo916] ip dhcp-server>
```

## Store Leases on Disk

Home menu level: */ip dhcp-server config*

### Description

Leases are always stored on disk on graceful shutdown and reboot. If on every lease change it is stored on disk, a lot of disk writes happen. There are no problems if it happens on a hard drive, but is very bad on Compact Flash (especially, if lease times are very short). To minimize writes on disk, all changes are flushed together every **store-leases-disk** seconds. If this time will be very short (immediately), then no changes will be lost even in case of hard reboots and power losts. But, on CF there may be too many writes in case of short lease times (as in case of hotspot). If this time will be very long (never), then there will be no writes on disk, but information about active leases may be lost in case of power loss. In these cases dhcp server may give out the same ip address to another client, if first one will not respond to ping requests.

### Property Description

**store-leases-disk** (*time-interval* | *immediately* | *never*; default: **5min**) - how frequently lease changes should be stored on disk

## DHCP Networks

Home menu level: */ip dhcp-server network*

### Property Description

**address** (*IP address* | *netmask*) - the network DHCP server(s) will lend addresses from

**boot-file-name** (*text*) - Boot file name

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**dhcp-option** (*text*) - add additional DHCP options from /ip dhcp-server option list. You cannot redefine parameters which are already defined in this submenu:

- **Subnet-Mask (code 1)** - netmask
- **Router (code 3)** - gateway
- **Domain-Server (code 6)** - dns-server
- **Domain-Name (code 15)** - domain
- **NETBIOS-Name-Server** - wins-server

**dns-server** (*text*) - the DHCP client will use these as the default DNS servers. Two comma-separated DNS servers can be specified to be used by DHCP client as primary and secondary DNS servers

**domain** (*text*) - the DHCP client will use this as the 'DNS domain' setting for the network adapter

**gateway** (*IP address*; default: **0.0.0.0**) - the default gateway to be used by DHCP clients

**netmask** (*integer: 0..32*; default: **0**) - the actual network mask to be used by DHCP client

- **0** - netmask from network address is to be used

**next-server** (*IP address*) - IP address of next server to use in bootstrap

**wins-server** (*text*) - the Windows DHCP client will use these as the default WINS servers. Two comma-separated WINS servers can be specified to be used by DHCP client as primary and secondary WINS servers

## Notes

The **address** field uses netmask to specify the range of addresses the given entry is valid for. The actual netmask clients will be using is specified in **netmask** property.

## DHCP Server Leases

Home menu level: */ip dhcp-server lease*

### Description

DHCP server lease submenu is used to monitor and manage server's leases. The issued leases are showed here as dynamic entries. You can also add static leases to issue the definite client (determined by MAC address) the specified IP address.

Generally, the DHCP lease it allocated as follows:

1. an unused lease is in **waiting** state
  2. if a client asks for an IP address, the server chooses one
  3. if the client will receive statically assigned address, the lease becomes **offered**, and then **bound** with the respective lease time
  4. if the client will receive a dynamic address (taken from an IP address pool), the router sends a ping packet and waits for answer for 0.5 seconds. During this time, the lease is marked **testing**
  5. in case, the address does not respond, the lease becomes **offered**, and then **bound** with the respective lease time
-

- in other case, the lease becomes **busy** for the lease time (there is a command to retest all busy addresses), and the client's request remains unanswered (the client will try again shortly)

A client may free the leased address. When the dynamic lease is removed, and the allocated address is returned to the address pool. But the static lease becomes **busy** until the client will reacquire the address.

**Note** that the IP addresses assigned statically are not probed.

## Property Description

**active-address** (*read-only: IP address*) - actual IP address for this lease

**active-client-id** (*read-only: text*) - actual client-id of the client

**active-mac-address** (*read-only: MAC address*) - actual MAC address of the client

**active-server** (*read-only:* ) - actual dhcp server, which serves this client

**address** (*IP address*) - specify ip address (or ip pool) for static lease

- **0.0.0.0** - use pool from server

**agent-circuit-id** (*read-only: text*) - circuit ID of DHCP relay agent

**agent-remote-id** (*read-only: text*) - Remote ID, set by DHCP relay agent

**block-access** (yes | no; default: **no**) - block access for this client (drop packets from this client)

**client-id** (*text*; default: **""**) - if specified, must match DHCP 'client identifier' option of the request

**expires-after** (*read-only: time*) - time until lease expires

**host-name** (*read-only: text*) - shows host name option from last received DHCP request

**lease-time** (*time*; default: **0s**) - time that the client may use an address

- **0s** - lease will never expire

**mac-address** (*MAC address*; default: **00:00:00:00:00:00**) - if specified, must match MAC address of the client

**radius** (*read-only: yes | no*) - shows, whether this dynamic lease is authenticated by RADIUS or not

**rate-limit** (*read-only: text*; default: **""**) - sets rate limit for active lease. Format is: rx-rate[/tx-rate] [rx-burst-rate[/tx-burst-rate] [rx-burst-threshold[/tx-burst-threshold] [rx-burst-time[/tx-burst-time]]]]. All rates should be numbers with optional 'k' (1,000s) or 'M' (1,000,000s). If tx-rate is not specified, rx-rate is as tx-rate too. Same goes for tx-burst-rate and tx-burst-threshold and tx-burst-time. If both rx-burst-threshold and tx-burst-threshold are not specified (but burst-rate is specified), rx-rate and tx-rate is used as burst thresholds. If both rx-burst-time and tx-burst-time are not specified, 1s is used as default.

**rx-rate** (*integer*; default: **0**) - maximal receive bitrate to the client (for users it is upload bitrate)

- **0** - no limitation

**server** (*read-only: name*) - server name which serves this client

**status** (*read-only: waiting | testing | authorizing | busy | offered | bound*) - lease status:

- **waiting** - not used static lease
  - **testing** - testing whether this address is used or not (only for dynamic leases) by pinging it with timeout of 0.5s
-

- **authorizing** - waiting for response from radius server
- **busy** - this address is assigned statically to a client or already exists in the network, so it can not be leased
- **offered** - server has offered this lease to a client, but did not receive confirmation from the client
- **bound** - server has received client's confirmation that it accepts offered address, it is using it now and will free the address not later, than the lease time will be over

**tx-rate** (*integer*; default: **0**) - maximal transmit bitrate to the client (for users it is download bitrate))

- **0** - no limitation

## Command Description

**check-status** - Check status of a given busy dynamic lease, and free it in case of no response

**make-static** - convert a dynamic lease to static one

## Notes

If **rate-limit** is specified, a simple queue is added with corresponding parameters when lease enters bound state. Arp entry is added right after adding of queue is done (only if add-arp is enabled for dhcp server). To be sure, that client cannot use his ip address without getting dhcp lease and thus avoiding rate-limit, reply-only mode must be used on that ethernet interface.

Even though client address may be changed (with adding a new item) in **lease print** list, it will not change for the client. It is true for any changes in the DHCP server configuration because of the nature of the DHCP protocol. Client tries to renew assigned IP address only when half a lease time is past (it tries to renew several times). Only when full lease time is past and IP address was not renewed, new lease is asked (rebind operation).

the deault **mac-address** value will never work! You should specify a correct MAC address there.

## Example

To assign 10.5.2.100 static IP address for the existing DHCP client (shown in the lease table as item #0):

```
[admin@lobo916] ip dhcp-server lease> print
Flags: X - disabled, H - hotspot, D - dynamic
#  ADDRESS          MAC-ADDRESS      EXPIRES-AFTER  SERVER      STATUS
0  D 10.5.2.90      00:04:EA:C6:0E:40 1h48m59s      switch     bound
1  D 10.5.2.91      00:04:EA:99:63:C0 1h42m51s      switch     bound
[admin@lobo916] ip dhcp-server lease> add copy-from=0 address=10.5.2.100
[admin@lobo916] ip dhcp-server lease> print
Flags: X - disabled, H - hotspot, D - dynamic
#  ADDRESS          MAC-ADDRESS      EXPIRES-AFTER  SERVER      STATUS
1  D 10.5.2.91      00:04:EA:99:63:C0 1h42m18s      switch     bound
2  10.5.2.100      00:04:EA:C6:0E:40 1h48m26s      switch     bound
[admin@lobo916] ip dhcp-server lease>
```

## DHCP Alert

Home menu level: */ip dhcp-server alert*

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## Description

To find any rogue DHCP servers as soon as they appear in your network, DHCP Alert tool can be used. It will monitor ethernet for all DHCP replies and check, whether this reply comes from a valid DHCP server. If reply from unknown DHCP server is detected, alert gets triggered:

```
[admin@lobo916] ip dhcp-server alert>/log print
00:34:23 dhcp,critical,error,warning,info,debug dhcp alert on Public:
    discovered unknown dhcp server, mac 00:02:29:60:36:E7, ip 10.5.8.236
[admin@lobo916] ip dhcp-server alert>
```

When the system alerts about a rogue DHCP server, it can execute a custom script.

As DHCP replies can be unicast, rogue dhcp detector may not receive any offer to other dhcp clients at all. To deal with this, rogue dhcp server acts as a dhcp client as well - it sends out dhcp discover requests once a minute

## Property Description

**alert-timeout** (*none* | *time*; default: **none**) - time, after which alert will be forgotten. If after that time the same server will be detected, new alert will be generated

- **none** - infinite time

**interface** (*name*) - interface, on which to run rogue DHCP server finder

**invalid-server** (*read-only: text*) - list of MAC addresses of detected unknown DHCP servers. Server is removed from this list after alert-timeout

**on-alert** (*text*) - script to run, when an unknown DHCP server is detected

**valid-server** (*text*) - list of MAC addresses of valid DHCP servers

## Notes

All alerts on an interface can be cleared at any time using command: **/ip dhcp-server alert reset-alert <interface>**

Note, that e-mail can be sent, using */system logging action add target=email*

## DHCP Option

Home menu level: */ip dhcp-server option*

## Description

With help of DHCP Option, it is possible to define additional custom options for DHCP Server.

## Property Description

**code** (*integer: 1..254*) - dhcp option code. All codes are available at <http://www.iana.org/assignments/bootp-dhcp-parameters>

**name** (*name*) - descriptive name of the option

**value** (*text*) - parameter's value in form of a string. If the string begins with "0x", it is assumed as a

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hexadecimal value

## Notes

The defined options you can use in `/ip dhcp-server network` submenu

According to the DHCP protocol, a parameter is returned to the DHCP client only if it requests this parameter, specifying the respective code in DHCP request Parameter-List (code 55) attribute. If the code is not included in Parameter-List attribute, DHCP server will not send it to the DHCP client.

## Example

This example shows how to set DHCP server to reply on DHCP client's Hostname request (code 12) with value **Host-A**.

Add an option named **Option-Hostname** with code **12** (Hostname) and value **Host-A**:

```
[admin@lobo916] ip dhcp-server option> add name=Hostname code=12 \
value="Host-A"
[admin@lobo916] ip dhcp-server option> print
# NAME CODE VALUE
0 Option-Hostname 12 Host-A
[admin@lobo916] ip dhcp-server option>
```

Use this option in DHCP server network list:

```
[admin@lobo916] ip dhcp-server network> add address=10.1.0.0/24 \
\... gateway=10.1.0.1 dhcp-option=Option-Hostname dns-server=159.148.60.20
[admin@lobo916] ip dhcp-server network> print detail
0 address=10.1.0.0/24 gateway=10.1.0.1 dns-server=159.148.60.20
dhcp-option=Option-Hostname
[admin@lobo916] ip dhcp-server network>
```

Now the DHCP server will reply with its Hostname **Host-A** to DHCP client (if requested)

## DHCP Relay

Home menu level: `/ip dhcp-relay`

### Description

DHCP Relay is just a proxy that is able to receive a DHCP request and resend it to the real DHCP server

### Property Description

**dhcp-server** (*text*) - list of DHCP servers' IP addresses which should the DHCP requests be forwarded to

**delay-threshold** (*time*; default: **none**) - if secs field in DHCP packet is smaller than delay-threshold, then this packet is ignored

**interface** (*name*) - interface name the DHCP relay will be working on

**local-address** (*IP address*; default: **0.0.0.0**) - the unique IP address of this DHCP relay needed for DHCP server to distinguish relays:

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- **0.0.0.0** - the IP address will be chosen automatically

**name** (*name*) - descriptive name for relay

## Notes

DHCP relay does not choose the particular DHCP server in the dhcp-server list, it just sent to all the listed servers.

## Example

To add a DHCP relay named **relay** on **ether1** interface resending all received requests to the **10.0.0.1** DHCP server:

```
[admin@lobo916] ip dhcp-relay> add name=relay interface=ether1 \
\... dhcp-server=10.0.0.1 disabled=no
[admin@lobo916] ip dhcp-relay> print
Flags: X - disabled, I - invalid
#    NAME                INTERFACE  DHCP-SERVER  LOCAL-ADDRESS
0    relay                ether1     10.0.0.1     0.0.0.0

[admin@lobo916] ip dhcp-relay>
```

## Question&Answer-Based Setup

Command name: */ip dhcp-server setup*

### Command Description

**addresses to give out** (*text*) - the pool of IP addresses DHCP server should lease to the clients

**dhcp address space** (*IP address | netmask*; default: **192.168.0.0/24**) - network the DHCP server will lease to the clients

**dhcp relay** (*IP address*; default: **0.0.0.0**) - the IP address of the DHCP relay between the DHCP server and the DHCP clients

**dhcp server interface** (*name*) - interface to run DHCP server on

**dns servers** (*IP address*) - IP address of the appropriate DNS server to be propagated to the DHCP clients

**gateway** (*IP address*; default: **0.0.0.0**) - the default gateway of the leased network

**lease time** (*time*; default: **3d**) - the time the lease will be valid

## Notes

Depending on current settings and answers to the previous questions, default values of following questions may be different. Some questions may disappear if they become redundant (for example, there is no use of asking for 'relay' when the server will lend the directly connected network)

## Example

To configure DHCP server on **ether1** interface to lend addresses from 10.0.0.2 to 10.0.0.254 which

---

belong to the **10.0.0.0/24** network with **10.0.0.1** gateway and **159.148.60.2** DNS server for the time of 3 days:

```
[admin@lobo916] ip dhcp-server> setup
Select interface to run DHCP server on

dhcp server interface: ether1
Select network for DHCP addresses

dhcp address space: 10.0.0.0/24
Select gateway for given network

gateway for dhcp network: 10.0.0.1
Select pool of ip addresses given out by DHCP server

addresses to give out: 10.0.0.2-10.0.0.254
Select DNS servers

dns servers: 159.148.60.20
Select lease time

lease time: 3d
[admin@lobo916] ip dhcp-server>
```

The wizard has made the following configuration based on the answers above:

```
[admin@lobo916] ip dhcp-server> print
Flags: X - disabled, I - invalid
#   NAME           INTERFACE RELAY           ADDRESS-POOL LEASE-TIME ADD-ARP
0   dhcp1          ether1    0.0.0.0           dhcp_pool1   3d         no

[admin@lobo916] ip dhcp-server> network print
# ADDRESS           GATEWAY           DNS-SERVER           WINS-SERVER           DOMAIN
0 10.0.0.0/24        10.0.0.1          159.148.60.20

[admin@lobo916] ip dhcp-server> /ip pool print
# NAME           RANGES
0 dhcp_pool1     10.0.0.2-10.0.0.254

[admin@lobo916] ip dhcp-server>
```

## General Information

### Dynamic Addressing, using DHCP-Relay

Let us consider that you have several IP networks 'behind' other routers, but you want to keep all DHCP servers on a single router. To do this, you need a DHCP relay on your network which relays DHCP requests from clients to DHCP server.

This example will show you how to configure a DHCP server and a DHCP relay which serve 2 IP networks - **192.168.1.0/24** and **192.168.2.0/24** that are behind a router **DHCP-Relay**.

IP addresses of **DHCP-Server**:

```
[admin@DHCP-Server] ip address> print
Flags: X - disabled, I - invalid, D - dynamic
#   ADDRESS           NETWORK           BROADCAST           INTERFACE
0   192.168.0.1/24      192.168.0.0       192.168.0.255       To-DHCP-Relay
1   10.1.0.2/24         10.1.0.0          10.1.0.255          Public
[admin@DHCP-Server] ip address>
```

---

## IP addresses of DHCP-Relay:

```
[admin@DHCP-Relay] ip address> print
Flags: X - disabled, I - invalid, D - dynamic
# ADDRESS NETWORK BROADCAST INTERFACE
0 192.168.0.1/24 192.168.0.0 192.168.0.255 To-DHCP-Server
1 192.168.1.1/24 192.168.1.0 192.168.1.255 Local1
2 192.168.2.1/24 192.168.2.0 192.168.2.255 Local2
[admin@DHCP-Relay] ip address>
```

To setup 2 DHCP Servers on **DHCP-Server** router add 2 pools. For networks **192.168.1.0/24** and **192.168.2.0**:

```
/ip pool add name=Local1-Pool ranges=192.168.1.11-192.168.1.100
/ip pool add name=Local2-Pool ranges=192.168.2.11-192.168.2.100

[admin@DHCP-Server] ip pool> print
# NAME RANGES
0 Local1-Pool 192.168.1.11-192.168.1.100
1 Local2-Pool 192.168.2.11-192.168.2.100
[admin@DHCP-Server] ip pool>
```

## Create DHCP Servers:

```
/ip dhcp-server add interface=To-DHCP-Relay relay=192.168.1.1 \
address-pool=Local1-Pool name=DHCP-1 disabled=no
/ip dhcp-server add interface=To-DHCP-Relay relay=192.168.2.1 \
address-pool=Local2-Pool name=DHCP-2 disabled=no

[admin@DHCP-Server] ip dhcp-server> print
Flags: X - disabled, I - invalid
# NAME INTERFACE RELAY ADDRESS-POOL LEASE-TIME ADD-ARP
0 DHCP-1 To-DHCP-Relay 192.168.1.1 Local1-Pool 3d00:00:00
1 DHCP-2 To-DHCP-Relay 192.168.2.1 Local2-Pool 3d00:00:00
[admin@DHCP-Server] ip dhcp-server>
```

## Configure respective networks:

```
/ip dhcp-server network add address=192.168.1.0/24 gateway=192.168.1.1 \
dns-server=159.148.60.20
/ip dhcp-server network add address=192.168.2.0/24 gateway=192.168.2.1 \
dns-server 159.148.60.20

[admin@DHCP-Server] ip dhcp-server network> print
# ADDRESS GATEWAY DNS-SERVER WINS-SERVER DOMAIN
0 192.168.1.0/24 192.168.1.1 159.148.60.20
1 192.168.2.0/24 192.168.2.1 159.148.60.20
[admin@DHCP-Server] ip dhcp-server network>
```

Configuration of **DHCP-Server** is done. Now let's configure **DHCP-Relay**:

```
/ip dhcp-relay add name=Local1-Relay interface=Local1 \
dhcp-server=192.168.0.1 local-address=192.168.1.1 disabled=no
/ip dhcp-relay add name=Local2-Relay interface=Local2 \
dhcp-server=192.168.0.1 local-address=192.168.2.1 disabled=no

[admin@DHCP-Relay] ip dhcp-relay> print
Flags: X - disabled, I - invalid
# NAME INTERFACE DHCP-SERVER LOCAL-ADDRESS
0 Local1-Relay Local1 192.168.0.1 192.168.1.1
1 Local2-Relay Local2 192.168.0.1 192.168.2.1
[admin@DHCP-Relay] ip dhcp-relay>
```

## IP Address assignment, using FreeRADIUS Server

Let us consider that we want to assign IP addresses for clients, using the RADIUS server.

---

We assume that you already have installed FreeRADIUS. Just add these lines to specified files:

users file:

```
00:0B:6B:31:02:4B      Auth-Type := Local, Password == ""
    Framed-IP-Address = 192.168.0.55
```

clients.conf file

```
client 172.16.0.1 {
    secret = MySecret
    shortname = Server
}
```

Configure Radius Client on RouterOS:

```
/radius add service=dhcp address=172.16.0.2 secret=MySecret
```

```
[admin@DHCP-Server] radius> print detail
```

```
Flags: X - disabled
```

```
0  service=dhcp called-id="" domain="" address=172.16.0.2 secret="MySecret"
    authentication-port=1812 accounting-port=1813 timeout=00:00:00.300
    accounting-backup=no realm=""
```

```
[admin@DHCP-Server] radius>
```

Setup DHCP Server:

1. Create an address pool:

```
/ip pool add name=Radius-Clients ranges=192.168.0.11-192.168.0.100
```

2. Add a DHCP server:

```
/ip dhcp-server add address-pool=Radius-Clients use-radius=yes interface=Local \
    disabled=no
```

3. Configure DHCP networks:

```
/ip dhcp-server network add address=192.168.0.0/24 gateway=192.168.0.1 \
    dns-server=159.148.147.194,159.148.60.20
```

Now the client with MAC address **00:0B:6B:31:02:4B** will always receive IP address **192.168.0.55**.

---